

CLAIMS

1. A curable composition which contains
 - (A) an organic compound containing at least two carbon-carbon double bonds reactive with a SiH group in each molecule,
 - (B) a compound having at least two SiH groups in each molecule,
 - (C) a hydrosilylation catalyst,
 - 10 (D) a silane coupling agent and/or an epoxy group-containing compound, and
 - (E) a silanol condensation catalyst.
2. The curable composition according to Claim 1,
15 wherein the component (E) is an organoaluminum compound and/or a borate ester.
3. The curable composition according to Claim 1 or 2,
20 wherein the component (D) is a silane coupling agent having at least one functional group selected from the group consisting of epoxy, methacryl, acryl, isocyanate, isocyanurate, vinyl and carbamate group and hydrolyzable silyl group in each molecule.
- 25 4. The curable composition according to Claim 1 or 2,
wherein the component (D) is a silane coupling agent having an epoxy group and a hydrolyzable silyl group in each molecule.
- 30 5. The curable composition according to any one of Claims 1 to 4,
wherein the component (E) is an aluminum chelate compound and/or an aluminum alcoholate compound.
- 35 6. The curable composition according to any one of Claims

1 to 4,

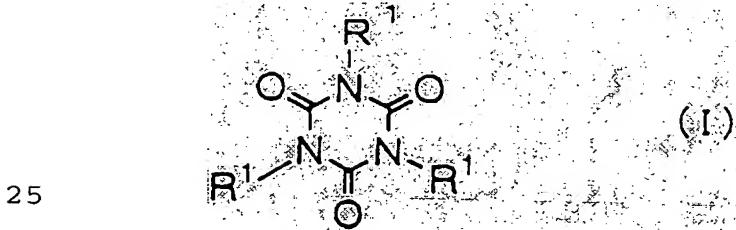
wherein the component (E) is at least one species selected from the group consisting of aluminum ethyl acetoacetate diisopropylate, aluminum ethyl acetoacetate diisobutylate,
 5 aluminum tris(ethyl acetoacetate), aluminum bis(ethyl acetoacetate) monoacetylacetone, and aluminum tris(acetylacetone).

7. The curable composition according to any one of Claims
 10 1 to 4,

wherein the component (E) is at least one species selected from the group consisting of trinormaloctadecyl borate, trinormaloctyl borate, trinormalbutyl borate, triisopropyl borate, trinormalpropyl borate, triethyl borate and trimethyl borate.
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8. The curable composition according to any one of Claims
 1 to 7,

wherein the component (A) is a compound represented by
 20 the following general formula (I):



in the formula, each R¹ represents a univalent organic group containing 1 to 50 carbon atoms and each R¹ group may be the same or different.

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9. The curable composition according to any one of Claims
 1 to 7,

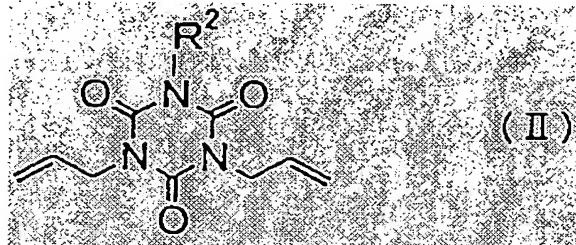
wherein the component (A) is triallyl isocyanurate and
 the component (B) is a reaction product from
 35 1,3,5,7-tetramethylcyclotetrasiloxane and triallyl

isocyanurate.

10. The curable composition according to any one of
Claims 1 to 7,

5 which contains a compound represented by the following
general formula (II) as the component (A) :

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in the formula, R^2 represents a hydrogen atom, or an organic group which does not contain a functional group subjectable to
hydrosilylation reaction.

11. The curable composition according to Claim 10,
which further contains triallyl isocyanurate as the
component (A).

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12. The curable composition according to Claim 10 or 11,
wherein R^2 represents a hydrogen atom, or a univalent
organic group containing 1 to 50 carbon atoms.

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13. The curable composition according to any one of
Claims 10 to 12,

wherein the compound represented by the general formula
(II) accounts for 20% by weight or more in the component (A).

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14. The curable composition according to any one of
Claims 11 to 13,

wherein the compound represented by the general formula
(II) is diallyl monoglycidyl isocyanurate.

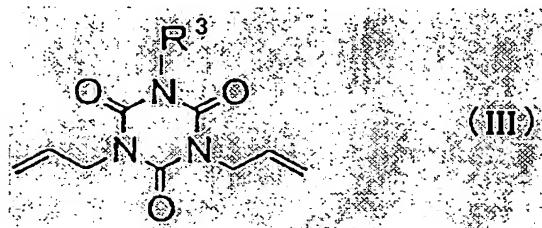
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15. The curable composition according to Claim 14,

wherein the component (B) is a reaction product from 1,3,5,7-tetramethylcyclotetrasiloxane and triallyl isocyanurate.

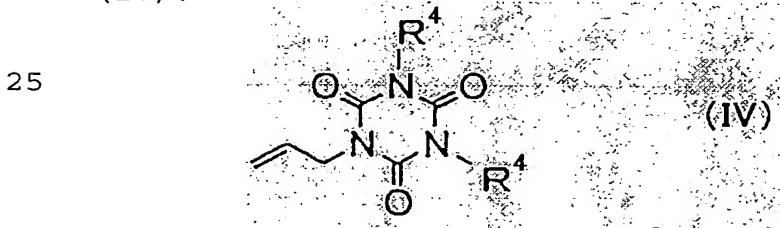
5 16. The curable composition according to any one of Claims 1 to 15,

 wherein the component (B) contains a compound obtainable by hydrosilylation reaction between a compound represented by the following general formula
10 (III) :



15 in the formula, R³ represents a hydrogen atom, or an organic group which does not contain a functional group subjectable to hydrosilylation reaction: and a compound having at least two SiH groups in each molecule, and/or

20 a compound obtainable by hydrosilylation reaction between a compound represented by the following general formula (IV) :



25 in the formula, R⁴ represents a hydrogen atom, or an organic group which does not contain a functional group subjectable to hydrosilylation reaction, and each R⁴ may be the same or different: and a compound having at least three SiH groups in each molecule.

35 17. The curable composition according to Claim 16,

wherein R³ and R⁴ represent hydrogen atoms or univalent organic groups containing 1 to 50 carbon atoms.

18. The curable composition according to Claim 16,
5 wherein the component (B) contains a reaction product from 1,3,5,7-tetramethylcyclotetrasiloxane and diallyl monoglycidyl isocyanurate, and/or a reaction product from 1,3,5,7-tetramethylcyclotetrasiloxane and monoallyl diglycidyl isocyanurate.

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19. The curable composition according to Claim 16,
wherein the component (B) contains a reaction product from 1,3,5,7-tetramethylcyclotetrasiloxane and diallyl monoglycidyl isocyanurate, and/or a reaction product from
15 1,3,5,7-tetramethylcyclotetrasiloxane and monoallyl diglycidyl isocyanurate as exclusive constituents.

20. The curable composition according to any one of Claims 16 to 19,

20 wherein the component (A) is triallyl isocyanurate.

21. The curable composition according to any one of Claims 16 to 19,

25 wherein the component (A) is a mixture of triallyl isocyanurate and diallyl monoglycidyl isocyanurate.

22. A curing product

which is obtainable by curing the curable composition according to any one of Claims 1 to 21.

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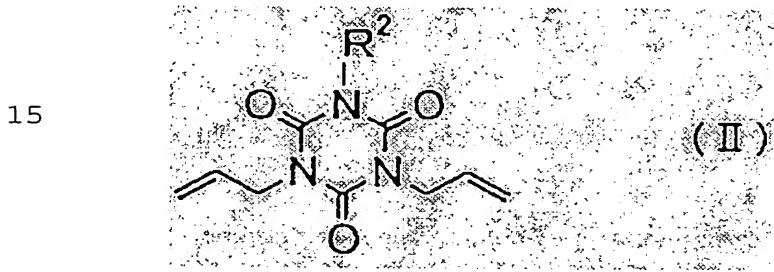
23. A process for producing a curing product which comprises curing the curable composition according to any one of Claims 1 to 21.

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24. A light-emitting diode

which is sealed with the curing product according to Claim 22.

25. A curable composition which contains
 5 (A) an organic compound containing at least two carbon-carbon double bonds reactive with a SiH group in each molecule,
 (B) a compound having at least two SiH groups in each molecule, and
 10 (C) a hydrosilylation catalyst,
 in which a compound represented by the following general formula (II) :



15 in the formula, R² represents a hydrogen atom, or an organic group which does not contain a functional group subjectable to hydrosilylation reaction: is contained as the component (A).

26. The curable composition according to Claim 25,
 which further contains triallyl isocyanurate as the
 25 component (A).

27. The curable composition according to Claim 25 or 26,
 wherein R² represents a hydrogen atom, or a univalent organic group containing 1 to 50 carbon atoms.

30 28. The curable composition according to any one of Claims 25 to 27,
 wherein the compound represented by the general formula (II) accounts for 20% by weight or more in the component (A).

29. The curable composition according to any one of Claims 26 to 28,

wherein the compound represented by the general formula (II) is diallyl monoglycidyl isocyanurate.

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30. The curable composition according to Claim 29, wherein the component (B) is a reaction product from 1,3,5,7-tetramethylcyclotetrasiloxane and triallyl isocyanurate.

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31. A curing product which is obtainable by curing the curable composition according to any one of Claims 25 to 30.

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32. A process for producing a curing product which comprises curing the curable composition according to any one of Claims 25 to 30.

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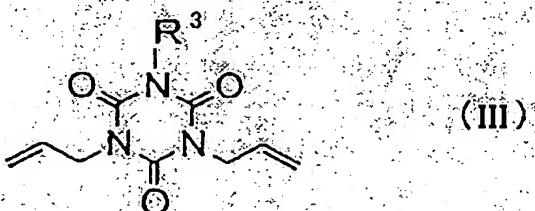
33. A curable composition which contains (A) an organic compound containing at least two carbon-carbon double bonds reactive with a SiH group in each molecule,

(B) a compound having at least two SiH groups in each molecule, and

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(C) a hydrosilylation catalyst, in which the component (B) contains a compound obtainable by hydrosilylation reaction between a compound represented by the following general formula (III):

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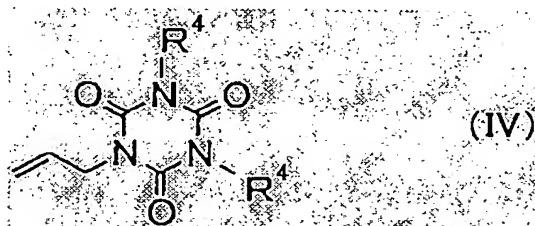


35 in the formula, R³ represents a hydrogen atom, or an organic

group which does not contain a functional group subjectable to hydrosilylation reaction: and a compound having at least two SiH groups in each molecule, and/or

5 a compound obtainable by hydrosilylation reaction
 between a compound represented by the following general formula
 (IV) :

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in the formula, R⁴ represents a hydrogen atom, or an organic group which does not contain a functional group subjectable to hydrosilylation reaction, and each R⁴ may be the same or

15 different: and a compound having at least three SiH groups in each molecule.

34. The curable composition according to Claim 33,
 wherein R³ and R⁴ represent hydrogen atoms, or univalent
 20 organic groups containing 1 to 50 carbon atoms.

35. The curable composition according to Claim 33,
 wherein the component (B) contains a reaction product
 from 1,3,5,7-tetramethylcyclotetrasiloxane and diallyl
 25 monoglycidyl isocyanurate, and/or
 1,3,5,7-tetramethylcyclotetrasiloxane and monoallyl
 diglycidyl isocyanurate.

36. The curable composition according to Claim 33,
 30 wherein the component (B) contains a reaction product
 from 1,3,5,7-tetramethylcyclotetrasiloxane and diallyl
 monoglycidyl isocyanurate, and/or a reaction product from
 1,3,5,7-tetramethylcyclotetrasiloxane and monoallyl
 diglycidyl isocyanurate as exclusive constituents.

37. The curable composition according to any one of Claims 33 to 36,

wherein the component (A) is triallyl isocyanurate.

5 38. The curable composition according to any one of Claims 33 to 36,

wherein the component (A) is a mixture of triallyl isocyanurate and diallyl monoglycidyl isocyanurate.

10 39. A curing product

which is obtainable by curing the curable composition according to any one of Claims 33 to 38.

15 40. A process for producing a curing product

which comprises curing the curable composition according to any one of Claims 33 to 38.

41. A light-emitting diode

20 which comprises a light emitting element, a substrate on the top surface of which is formed with an external electrode to be disposed with said light emitting element, and a sealing member disposed adjacently onto said substrate,

25 the contact surface between said electrode and said sealing member being 50 to 90% when the contact surface between said substrate and said sealing member is set at 100%, and

30 said sealing member being a curing product obtainable from a curable composition containing

(A) an organic compound containing at least two carbon-carbon double bonds reactive with a SiH group in each molecule,

(B) a compound having at least two SiH groups in each molecule,

(C) a hydrosilylation catalyst,

35 (D) a silane coupling agent and/or an epoxy group-containing compound, and

(E) a silanol condensation catalyst.

42. The light emitting diode according to Claim 41,
wherein the substrate is formed from a composition
5 containing a semicrystalline polymer resin.

. 43. A light-emitting diode
which comprises a light emitting element, a package
comprising an aperture having a bottom surface to be disposed
10 with said light emitting element and sidewalls, and a sealing
member for sealing said aperture,

said package being formed of a molding resin by a
monolithic process with one end of the external electrode being
exposed on said aperture bottom,

15 the area of said external electrode on said aperture
bottom being 50 to 90% when the surface area of said aperture
bottom is set at 100%

and said sealing member being a curing product obtainable
from a curable composition containing

20 (A) an organic compound containing at least two
carbon-carbon double bonds reactive with a SiH group in each
molecule,

(B) a compound having at least two SiH groups in each
molecule,

25 (C) a hydrosilylation catalyst,

(D) a silane coupling agent and/or an epoxy
group-containing compound, and

(E) a silanol condensation catalyst.

30 44. The light-emitting diode according to Claim 43,
wherein the package is formed of a molding resin by a
monolithic process with the respective ends of an external
positive electrode and an external negative electrode being
exposed at a predetermined distance on the aperture bottom,
35 and said respective exposed external electrode on said

aperture bottom having at least one pair of resin exposure parts of the molding resin of the package.

45. The light-emitting diode according to Claim 43 or
5 44,

wherein the molding resin of the package is a composition containing a semicrystalline polymer resin.

46. The light-emitting diode according to any one of
10 Claims 41 to 45,

wherein the component (D) is a silane coupling agent having at least one functional group selected from the group consisting of epoxy, methacryl, acryl, isocyanate, isocyanurate, vinyl and carbamate group and a hydrolyzable 15 silyl group in each molecule.

47. The light-emitting diode according to any one of Claims 41 to 46,

wherein the component (E) is an organoaluminum compound 20 and/or a borate ester.

48. The light-emitting diode according to any one of Claims 41 to 46,

wherein the component (E) is at least one species selected 25 from the group consisting of aluminum ethyl acetoacetate diisopropylate, aluminum ethyl acetoacetate diisobutylate, aluminum tris(ethyl acetoacetate), aluminum bis(ethyl acetoacetate) monoacetylacetone, and aluminum tris(acetylacetone).
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49. The light-emitting diode according to any one of Claims 41 to 46,

wherein the component (E) is at least one species selected 35 from the group consisting of trinormaloctadecyl borate, trinormaloctyl borate, trinormalbutyl borate, triisopropyl

borate, trinormalpropyl borate, triethyl borate and trimethyl borate.

50. The light-emitting diode according to any one of
5 Claims 41 to 49,

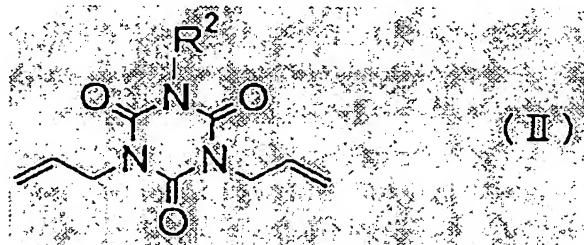
wherein the component (A) is triallyl isocyanurate and the component (B) is a reaction product from 1,3,5,7-tetramethylcyclotetrasiloxane and triallyl isocyanurate.

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51. The light-emitting diode according to any one of Claims 41 to 49,

wherein the curable composition contains a compound represented by the following general formula (II) as the
15 component (A):

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in the formula, R² represents a hydrogen atom, or an organic group which does not contain a functional group subjectable to hydrosilylation reaction.

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52. The light-emitting diode according to Claim 51,
wherein the curable composition further contains triallyl isocyanurate as the component (A).

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53. The light-emitting diode according to Claim 51 or 52,

wherein the compound represented by the general formula (II) accounts for 20% by weight or more in the component (A).

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54. The light-emitting diode according to any one of

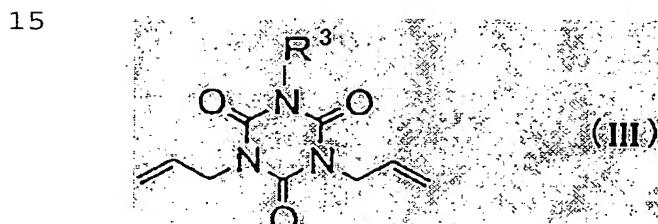
Claims 51 to 53,

wherein the compound represented by the general formula (II) is diallyl monoglycidyl isocyanurate.

5 55. The light-emitting diode according to Claim 54,
wherein the component (B) is a reaction product from
1,3,5,7-tetramethylcyclotetrasiloxane and triallyl
isocyanurate.

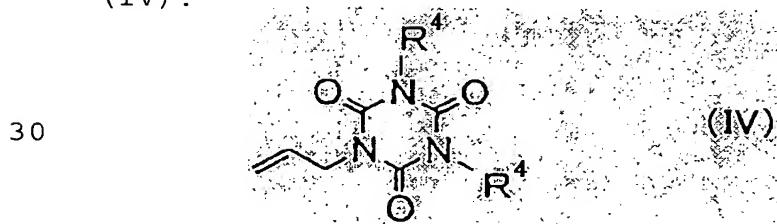
10 56. The light-emitting diode according to any one of
Claims 41 to 54,

wherein the component (B) contains a compound obtainable
by hydrosilylation reaction between a compound represented by
the following general formula (III):



20 in the formula, R³ represents a hydrogen atom, or an organic group which does not contain a functional group subjectable to hydrosilylation reaction: and a compound having at least two SiH groups in each molecule, and/or

25 a compound obtainable by hydrosilylation reaction
between a compound represented by the following general formula
(IV):



35 in the formula, R⁴ represents a hydrogen atom, or an organic group which does not contain a functional group subjectable to hydrosilylation reaction and each R⁴ may be the same or

different: and a compound having at least three SiH groups in each molecule.

57. The light-emitting diode according to Claim 56,
5 wherein the component (B) contains a reaction product from 1,3,5,7-tetramethylcyclotetrasiloxane and diallyl monoglycidyl isocyanurate, and/or a reaction product from 1,3,5,7-tetramethylcyclotetrasiloxane and monoallyl diglycidyl isocyanurate.

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58. The light-emitting diode according to Claim 56,
wherein the curable composition contains, as the component (B), a reaction product from 1,3,5,7-tetramethylcyclotetrasiloxane and diallyl 15 monoglycidyl isocyanurate, and/or a reaction product from 1,3,5,7-tetramethylcyclotetrasiloxane and monoallyl diglycidyl isocyanurate as exclusive constituents.

59. The light-emitting diode according to any one of
20 Claims 56 to 58,
wherein the component (A) is triallyl isocyanurate.

60. The light-emitting diode according to any one of
Claims 56 to 58,
25 wherein the component (A) is a mixture of triallyl isocyanurate and diallyl monoglycidyl isocyanurate.

61. A light-emitting diode
which comprises a light emitting element, a package
30 comprising an aperture having a bottom surface to be disposed with said light emitting element and sidewalls, and a sealing member for sealing said aperture,
said package being formed of a molding resin by a monolithic process with one end of the external electrode being
35 exposed on said aperture bottom,

the area of said external electrode on said aperture bottom being 50 to 90% when the surface area of said aperture bottom is set at 100%

and said sealing member containing the curing product
5 according to Claim 31 or 39.

62. The light-emitting diode according to Claim 61,
wherein the package is formed of a molding resin by a
monolithic process with the respective ends of an external
10 positive electrode and an external negative electrode being
exposed at a predetermined distance on the aperture bottom,
and said respective exposed external electrode on said
aperture bottom having at least one pair of resin exposure parts
of the molding resin of the package.

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63. The light-emitting diode according to Claim 61 or
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wherein the molding resin of the package is a composition
containing a semicrystalline polymer resin.

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